

CLAIMS

What Is Claimed Is:

1. A blank for the manufacture of a dental model fabricated from a partially
5 sintered ceramic material.

2. The blank of claim 1 wherein the partially sintered material comprises
alumina, zirconia, magnesia, zircon, aluminosilicate, cordierite, mica, quartz, cristobolite,
silica, leucite, silicon nitride, silicon carbide, silica-alumina-nitrides, mullite, garnet, or
10 mixtures thereof.

3. The blank of claim 1 wherein the partially sintered ceramic material is derived
from a mixture comprising a refractory ceramic material and a binder.

15 4. The blank of claim 3 wherein the refractory ceramic material comprises
alumina, zirconia, magnesia, zircon, aluminosilicate, cordierite, mica, quartz, cristobolite,
silica, leucite, silicon nitride, silicon carbide, silica-alumina-nitrides, mullite, garnet, or
mixtures thereof.

20 5. The blank of claim 3 wherein the binder comprises an inorganic material, an
organic material, or mixtures thereof.

25 6. The blank of claim 5 wherein the organic material comprises polyvinyl
pyrrolidine, polyvinyl alcohol, polyvinyl acetate, polyvinyl chloride, polyvinyl butyral and
polystyrene, or mixtures thereof.

7. The blank of claim 5 wherein the inorganic material comprises magnesium
oxide, ammonium phosphate, colloidal silica, calcium sulfate, magnesium phosphate,
alkaline silicates, silica hydrosol, colloidal clays, or mixtures thereof.

8. The blank of claim 1 wherein the partially sintered ceramic material is sintered to less than about 92% of theoretical full density;

5 9. The blank of claim 1 wherein the partially sintered ceramic material is sintered to less than about 80% of theoretical full density.

10. The blank of claim 1 wherein the partially sintered ceramic material is sintered to less than about 75% of theoretical full density.

10 11. The blank of claim 1 having a flexural strength in the range from about 1 to about 75 MPa.

15 12. The blank of claim 1 having a flexural strength in the range from about 3 to about 20 MPa.

13. The blank of claim 1 wherein the partially sintered ceramic material comprises a refractory investment material.

20 14. The blank of claim 1 wherein the partially sintered ceramic material comprises a castable investment material.

15. The blank of claim 1 wherein the dental model it is used for the manufacture of a dental restoration.

25 16. The blank of claim 15 wherein the dental restoration is selected from the group consisting of crowns, bridges, space maintainers, tooth replacement appliances, orthodontic retainers, dentures, posts, jackets, inlays, onlays, facings, veneers, facets, implants, abutments, splints, partial crowns, teeth, cylinders, pins, and connectors.

17. A method for making a dental restoration comprising:
milling a dental model from a partially sintered ceramic material;
applying dental material thereon; and
curing the dental material on the model to obtain a dental restoration.
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18. The method of claim 17 wherein the curing process comprises sintering, light curing, or heat curing.
- 10 19. The method of claim 17 wherein the dental material comprises a metal material, a ceramic material, a composite material or mixtures thereof.
20. The method of claim 19 wherein the metal material comprises a single metal or an alloy of two or more metals.
- 15 21. The method of claim 19 wherein the metal material comprises metal powder in combination with a binder.
22. The method of claim 21 wherein the metal powder in combination with the
20 binder is in the form a sheet.
23. The method of claim 19 wherein the metal material is in the form of a foil.
24. The method of claim 19 wherein the ceramic material comprises porcelain.
- 25 25. The method of claim 19 wherein the ceramic comprises a high-strength
material.
26. The method of claim 19 wherein the composite material comprises a material

selected from a particulate-reinforced polymeric material, a fiber-reinforced polymeric material and mixtures thereof.

27. The method of claim 17 wherein one or more layers of material are applied on
5 the dental restoration.

28. The method of claim 27 wherein the one or more layers of material comprises a material selected from the group consisting of a porcelain or composite material.

10 29. A method for making a dental restoration comprising:
obtaining data of a patient's tooth;
milling a dental model from a partially sintered ceramic material based on the data obtained from the patient's tooth.

15 30. The method of claim 29 wherein the data obtained from the patient's tooth is acquired by photographing the patient's tooth.

31. The method of claim 29 wherein the data obtained from the patient's tooth is acquired by scanning the patient's tooth.

20 32. The method of claim 29 further comprising:
applying dental material onto the model; and
heating the model and dental material thereon to obtain a dental restoration.

25 33. A method of making a blank for the manufacture of dental model comprising:
forming a mixture comprising a refractory material and a binder into a shape; and
partially sintering the formed shape.

34. The method of claim 33 wherein the refractory material comprises one or

more materials selected from the group consisting of alumina, zirconia, magnesia, zircon, aluminosilicate, cordierite, mica, quartz, cristobolite, silica, silicon nitride, silicon carbide, leucite, silica-alumina-nitrides, mullite, garnet, or mixtures thereof.

5 35. The method of claim 33 wherein the binder comprises an inorganic material, an organic material, or mixtures thereof.

10 36. The method of claim 33 wherein the organic material comprises polyvinyl pyrrolidine, polyvinyl alcohol, polyvinyl acetate, polyvinyl chloride, polyvinyl butryal and polystyrene, or mixtures thereof.

15 37. The method of claim 33 wherein the inorganic material comprises magnesium oxide, ammonium phosphate, colloidal silica, calcium sulfate, magnesium phosphate, alkaline silicates, silica hydrosol, colloidal clays, and mixtures thereof.

20 38. The method of claim 33 wherein the partially sintering step is conducted at a temperature to provide a partially sintered ceramic material having a density less than about 92% theoretical full density.

25 39. The method of claim 33 wherein the partially sintering step is conducted for a time to provide a partially sintered ceramic material having a density less than about 92% theoretical full density.

40. The method of claim 33 wherein the partially sintering step is conducted at a temperature to provide a partially sintered ceramic material having a density less than about 80% theoretical full density.

41. The method of claim 33 wherein the partially sintering step is conducted for a time to provide a partially sintered ceramic material having a density less than about 80%

theoretical full density.

42. The method of claim 33 wherein the partially sintering step is conducted at a temperature to provide a partially sintered ceramic material having a density less than about
5 75% theoretical full density.

43. The method of claim 33 wherein the partially sintering step is conducted for a time to provide a partially sintered ceramic material having a density less than about 75% theoretical full density.

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